

Claims

1. A process for preparation of a crosslinked asphalt composition, comprising:
 - heating an asphalt composition at a first temperature of from 250 (121 °C) to 430 °F (221 °C), in the presence of a) a crosslinkable polymer and b) a crosslink co-agent;
 - adding a crosslinking initiator at a second temperature of greater than 360 °F; and
 - agitating the resulting mixture at a temperature at from 360 to 410 °F for a period of time sufficient to complete crosslinking.
2. The process as claimed in claim 1, wherein said crosslinkable polymer is a member selected from the group consisting of (co)polymers containing styrene units and/or butadiene units.
3. The process as claimed in claim 2, wherein said crosslinkable polymer is a member selected from the group consisting of polymers containing polystyrene blocks and/or polybutadiene blocks.
4. The process as claimed in claim 3, wherein said crosslinkable polymer is a member selected from the group consisting of SBR, SBS and BR.
5. The process as claimed in claim 4, wherein said crosslinkable polymer is an SBS high molecular weight radial polymer.
6. The process as claimed in claim 1, wherein said crosslink co-agent is a compound having a boiling point above 212 °F (100°C) and having a greater affinity to react with the crosslinkable polymer than with the asphalt composition.
7. The process as claimed in claim 6, wherein said crosslink co-agent is a member selected from the group consisting of dimaleimide compounds and cyanurate compounds.
8. The process as claimed in claim 7, wherein said crosslink co-agent is a member selected from the group consisting of phenylenedimaleimide, triallyl cyanurate and isocyanurate.

9. The process as claimed in claim 1, wherein said crosslink initiator is a member selected from the group consisting of organic peroxides, sulfur and sulfur donor compounds.

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10. The process as claimed in claim 9, wherein said crosslink initiator is a member selected from the group consisting of di-(tert-butyl peroxyisopropyl)benzene, 1,5-diethyl-2,5-di-(tert-butyl-peroxy)-hexyne, tert-butyl cumyl peroxide, dicumyl peroxide, 1,5-dimethyl-2,5-di (tert-butyl-peroxy)-hexane, di-(2-tert-butylperoxypropyl-(2))-benzene, n-Butyl 4,4-di (tert-butylperoxy)-valerate, and 1-di (tert-butylperoxy)-3,3,5- trimethylcyclohexane elemental sulfur, 4,4'-dithiodimorpholine, thioacetamide, thiazole, sulfenamide, dithiocarbamates, xanthates, and thiurams.

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11. The process as claimed in claim 9, wherein said crosslink initiator is a combination of both an organic peroxide and a member selected from sulfur and sulfur donors.

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12. The process as claimed in claim 11, wherein said organic peroxide is added first, with said sulfur or sulfur donor being added after completion of said agitating step, followed by further agitation.

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13. A crosslinked asphalt composition comprising:

- a) an asphalt composition; and
- b) a crosslinked polymer, comprising a polymer having one or more crosslinks that contain one or more residues from a crosslink co-agent, and further containing one or more residues from a crosslink initiator.

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14. The composition as claimed in claim 13, wherein said polymer is a member selected from the group consisting of (co)polymers containing styrene units and/or butadiene units.

15. The composition as claimed in claim 14, wherein said polymer is a member selected from the group consisting of polymers containing polystyrene blocks and/or polybutadiene blocks.

16. The composition as claimed in claim 15, wherein said polymer is a member selected from the group consisting of SBR, SBS and BR.

17. The composition as claimed in claim 16, wherein said crosslinkable polymer is an SBS high molecular weight radial polymer.

18. The composition as claimed in claim 13, wherein said crosslink co-agent is a compound having a boiling point above 212 °F (100°C) and having a greater affinity to react with the polymer than with the asphalt composition.

19. The composition as claimed in claim 18, wherein said crosslink co-agent is a member selected from the group consisting of dimaleimide compounds and cyanurate compounds.

20. The composition as claimed in claim 19, wherein said crosslink co-agent is a member selected from the group consisting of phenylenedimaleimide, triallyl cyanurate and isocyanurate.

21. The composition as claimed in claim 13, wherein said crosslink initiator is a member selected from the group consisting of organic peroxides, sulfur and sulfur donor compounds.

22. The composition as claimed in claim 21, wherein said crosslink initiator is a member selected from the group consisting of di-(tert-butyl peroxyisopropyl)benzene, 1,5-diethyl-2,5-di-(tert-butyl-peroxy)-hexyne, tert-butyl cumyl peroxide, dicumyl peroxide, 1,5-dimethyl-2,5-di (tert-butyl-peroxy)-hexane, di-(2-tert-butylperoxypropyl-(2))-benzene, n-Butyl 4,4-di (tert-butylperoxy)-valerate, and 1-di (tert-butylperoxy)-3,3,5- trimethylcyclohexane elemental sulfur,

4,4'-dithiodimorpholine, thioacetamide, thiazole, sulfenamide, dithiocarbamates, xanthates, and thiurams .

23. The composition as claimed in claim 21, wherein said crosslink initiator is a combination of both an organic peroxide and a member selected from sulfur and sulfur donors.

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4,4'-dithiodimorpholine, thioacetamide, thiazole, sulfenamide, dithiocarbamates, xanthates, and thiurams .